

**Acer RAID Ready Systems**  
*With Intel Matrix storage Manager*  
*User's Guide*



**Acer Incorporated**

**Version: v1.1**

**Date: August, 2007**

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## Revision History

Rev. #	Date	Explanation of Change	Approved by
1.0	2007/08/15	First release	
1.1	2007/8/22	Format and spelling enhancement	

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## **1. Introduction**

This document will assist customers in evaluating, configuring and enabling RAID functionality on Acer RAID Ready platforms using the *Intel® Matrix Storage Manager* software.

This document also describes RAID volume management such as creating, deleting, and modifying volumes, common usage models, and any special notes necessary to enable customers to develop their RAID-compatible products.

Selected high-end Acer desktop systems are configured as Intel **RAID Ready** systems. A "RAID Ready" system can be upgraded to RAID0, RAID1, RAID5 or RAID10 using the RAID migration feature built into Intel Matrix Storage Manager 7.5. This technology enables you to install additional SATA hard drives, and then migrate a RAID Ready configuration to a RAID0, RAID1, RAID5 or RAID10 configuration.

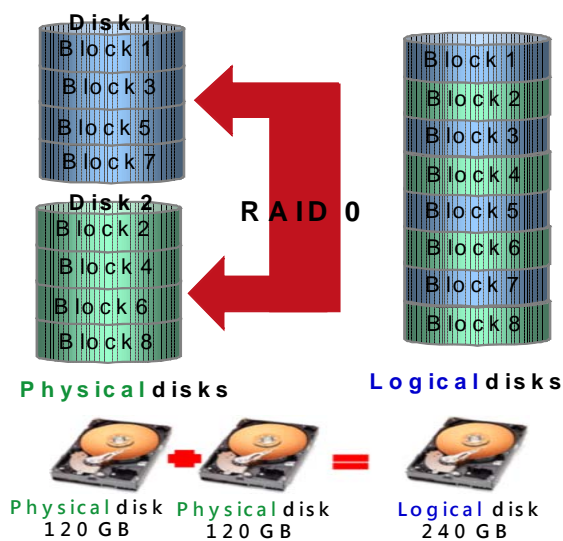
Before you start to build your RAID system, please do check **Section 3 "Warnings and Reminders"** for more detailed information. You can also check the on-line user's manual for the Intel Matrix Storage manager in Windows for detailed RAID function execution.

## 2. RAID Technology and Selection

**RAID** (a redundant array of inexpensive disks, also later known as a redundant array of independent disks) is a system that uses multiple hard drives to share or replicate data among the drives. Depending on the version chosen, **the benefits of RAID** are one or more of the following: **greater capacity, reliability, protection of data, and/or speed** compared to a single drive.

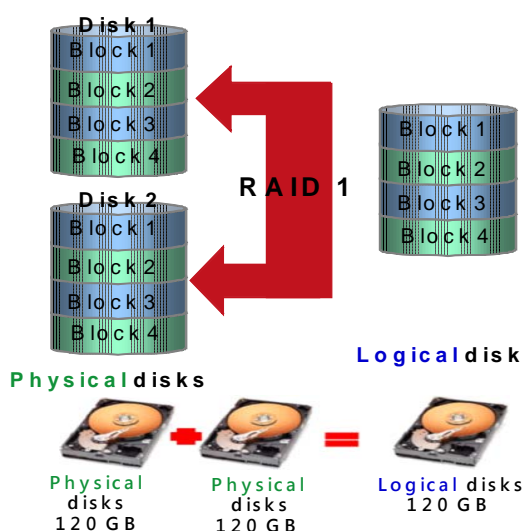
### RAID0 (striping)

- RAID0 **splits data evenly** across two or more disks with no parity information for redundancy.
- Multiple files can be read (and written) simultaneously and transfer time is improved dramatically, thus **increasing throughput**.
- RAID0 volume capacity = **number of (HDDs) x (capacity of smallest HDD)**
- RAID0 can be created with disks of differing sizes, but the storage space added to the array by each disk is limited to the size of the smallest disk. For example, if a 120 GB disk is striped together with a 100 GB disk, the size of the array will be 200 GB.



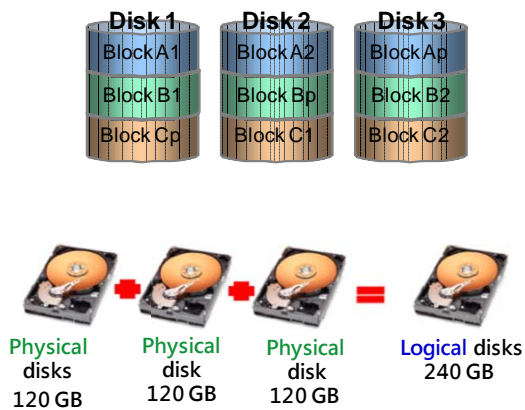
### RAID1 (mirroring)

- RAID1 creates an **exact copy (or mirror)** of a set of data on two or more disks when **reliability** is more important than data capacity.
- A classic RAID1 mirrored pair contains two disks, which increases reliability exponentially over a single disk.
  - Mirroring allows continued operation of the system in the event of one drive or array failing.
  - Restoration can be performed using the mirrored copy.
  - I/O performance may suffer during reconstruction due to the increased activity between locations.
- RAID1 volume capacity = **capacity of smallest HDD**
- Such an array can only be as large as the smallest member disk.

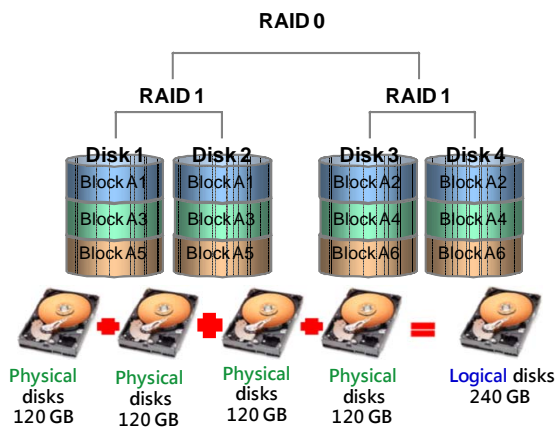


### RAID5 (striping with parity)

- RAID5 uses block-level striping with parity data distributed across all member disks.
- A RAID5 array can withstand a single disk failure without losing data or access to data.
- RAID5 is a good all-round system that combines efficient storage with excellent security and decent performance. It is ideal for file and application servers.
- RAID5 volume capacity = **[(number of HDDs) - 1] x (capacity of smallest HDD)**

**RAID10 (RAID1+0: striping + mirroring)**

- A combination of RAID1 and RAID0 – mirroring and striping, but without parity.
- RAID10 is used for both replicating and sharing data among disks.
- RAID10 is often the primary choice for high-load databases, because the lack of parity to calculate gives it faster write speeds.
- RAID10 volume capacity = 2 x (capacity of smallest HDD)



	Characteristics/Advantages	Disadvantages
<b>RAID0</b>	<ul style="list-style-type: none"> <li>➤ RAID0 implements a striped disk array, the data is broken down into blocks and each block is written to a separate disk drive</li> <li>➤ I/O performance is greatly improved by spreading the I/O load across many channels and drives</li> <li>➤ Best performance is achieved when data is striped across</li> </ul>	<ul style="list-style-type: none"> <li>➤ Not a "True" RAID because it is NOT fault-tolerant</li> <li>➤ The failure of just one drive will result in all data in an array being lost</li> <li>➤ Should never be used in mission-critical environments</li> </ul>

	<p>multiple controllers with only one drive per controller</p> <ul style="list-style-type: none"> <li>➤ Very simple design</li> <li>➤ Easy to implement</li> </ul>	
<b>RAID1</b>	<ul style="list-style-type: none"> <li>➤ Twice the Read transaction rate of single disks, same Write transaction rate as single disks</li> <li>➤ 100 percent redundancy of data means no rebuild is necessary in case of a disk failure, just a copy to the replacement disk</li> <li>➤ Transfer rate per block is equal to that of a single disk</li> <li>➤ Under certain circumstances, RAID1 can sustain multiple simultaneous drive failures</li> <li>➤ Simplest RAID storage subsystem design</li> </ul>	<ul style="list-style-type: none"> <li>➤ Highest disk overhead of all RAID types (100%) – inefficient</li> <li>➤ May not support hot-swap of failed disk when implemented using software RAID</li> </ul>
<b>RAID5</b>	<ul style="list-style-type: none"> <li>➤ Highest Read data transaction rate</li> <li>➤ Medium Write data transaction rate</li> <li>➤ Low ratio of ECC (parity) disks to data disks means high efficiency</li> <li>➤ Good aggregate transfer rate</li> </ul>	<ul style="list-style-type: none"> <li>➤ Most complex controller design</li> <li>➤ Difficult to rebuild in the event of a disk failure (as compared to RAID 1)</li> <li>➤ Individual block data transfer rate same as single disk</li> </ul>
<b>RAID10</b>	<ul style="list-style-type: none"> <li>➤ Very high I/O rates are achieved by striping RAID1 segments</li> <li>➤ Excellent solution for sites that would normally use RAID1</li> </ul>	<ul style="list-style-type: none"> <li>➤ Very limited scalability at a very high inherent cost</li> <li>➤ Expensive to maintain</li> </ul>



### 3. Warnings and reminders

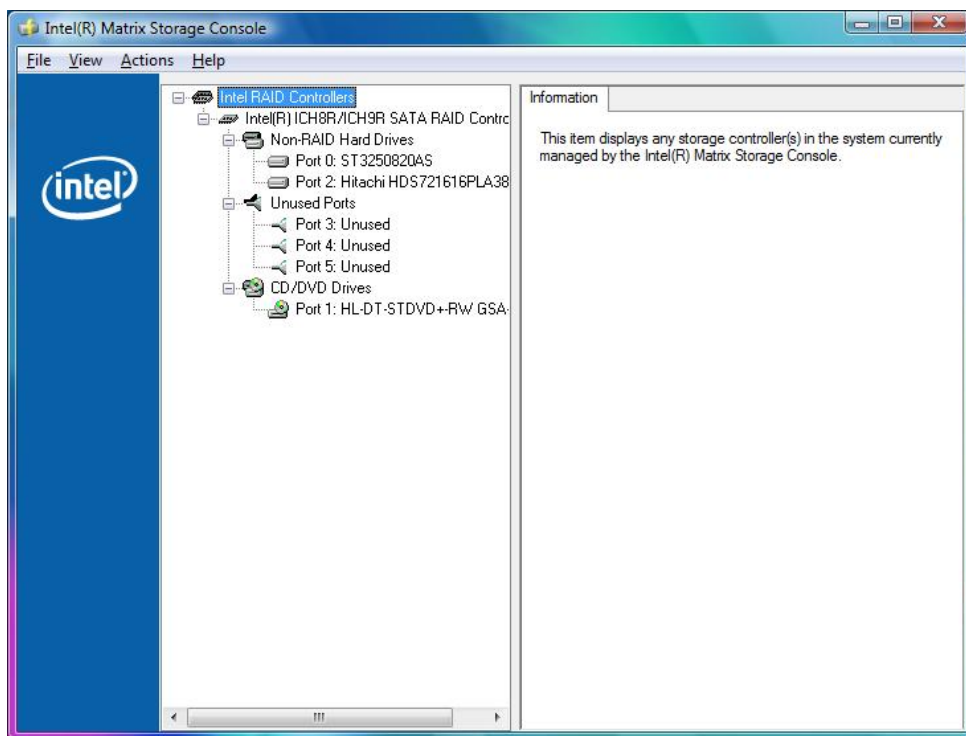
- A. Using the Intel® Matrix Storage Console in Windows® is highly recommended. You may use Intel Matrix Storage manager console in Windows for most RAID functions. However, using the Intel® Matrix Storage Manager option ROM (accessed by pressing Ctrl-I when starting your computer) is **NOT** recommended, because it will reformat the hard disk and Acer eRecovery Management's Restore to Factory Defaults function will NOT be usable anymore.
- B. Enabling RAID on your system is a time-intensive process and it is important that your computer stay on during the whole process, or you will risk data loss. Disable your screen saver and power-management options such as auto-shutdown, auto-hibernate and auto-standby. Plug your system into an AC adapter before attempting to enable RAID on your system.
- C. Enabling RAID may change how your hard disk drives are ordered, and Acer eRecovery Management may not function properly if your system does not have the needed drive ordering.
- D. You cannot use Acer eRecovery Management to revert your system to a non-RAID configuration after enabling the RAID function.
- E. The HDD password feature will not function once the RAID function has been enabled.
- F. Before enabling RAID on your system, back up important data and applications using Acer eRecovery Management or another appropriate backup tool.
- G. If you plan to enable RAID0 or Matrix RAID on your system, you cannot return your system to a non-RAID state without reformatting your system.
- H. Please refer to section 8 if you wish to install the RAID function by yourself. Install Intel® Matrix Storage Drivers are needed prior enabling the RAID function.

#### 4. Enabling the RAID function with Intel Matrix Storage Manager Console

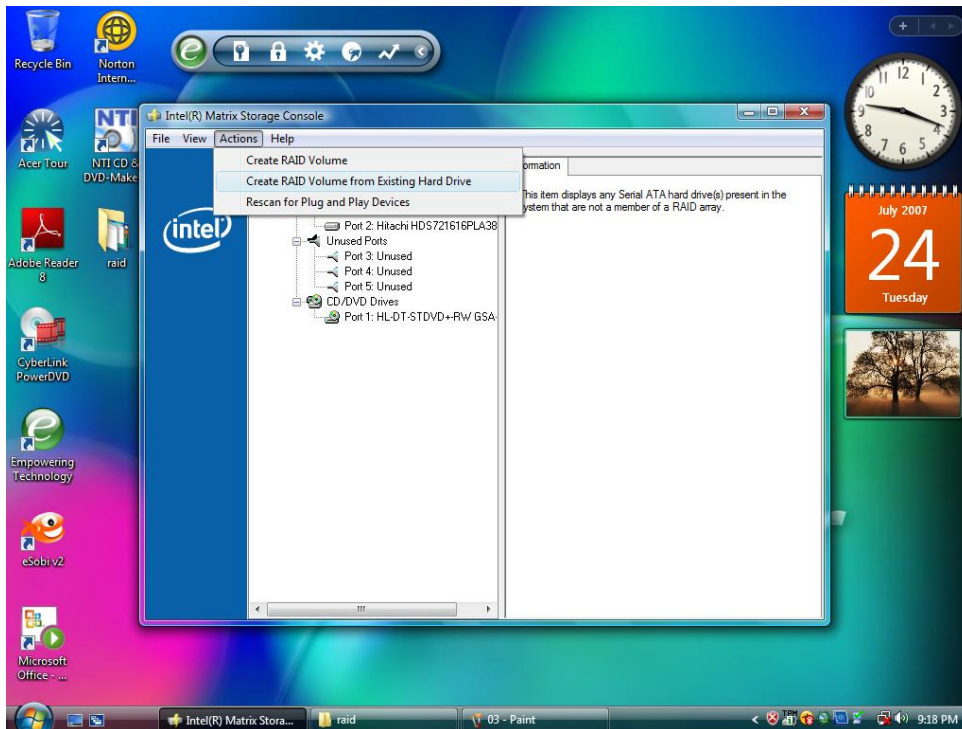
- 1) Select "Intel Matrix Storage" from Start menu -> Intel® Matrix Storage Console  
-> Intel Matrix Storage Console



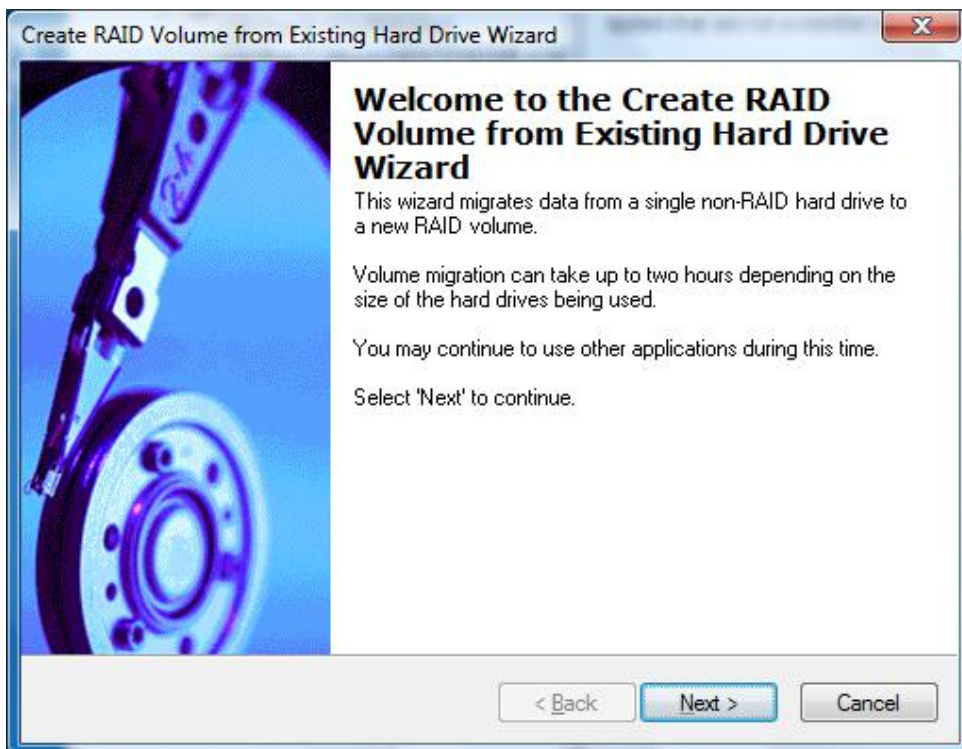
- 2) The Console will show current SATA HDD connection status



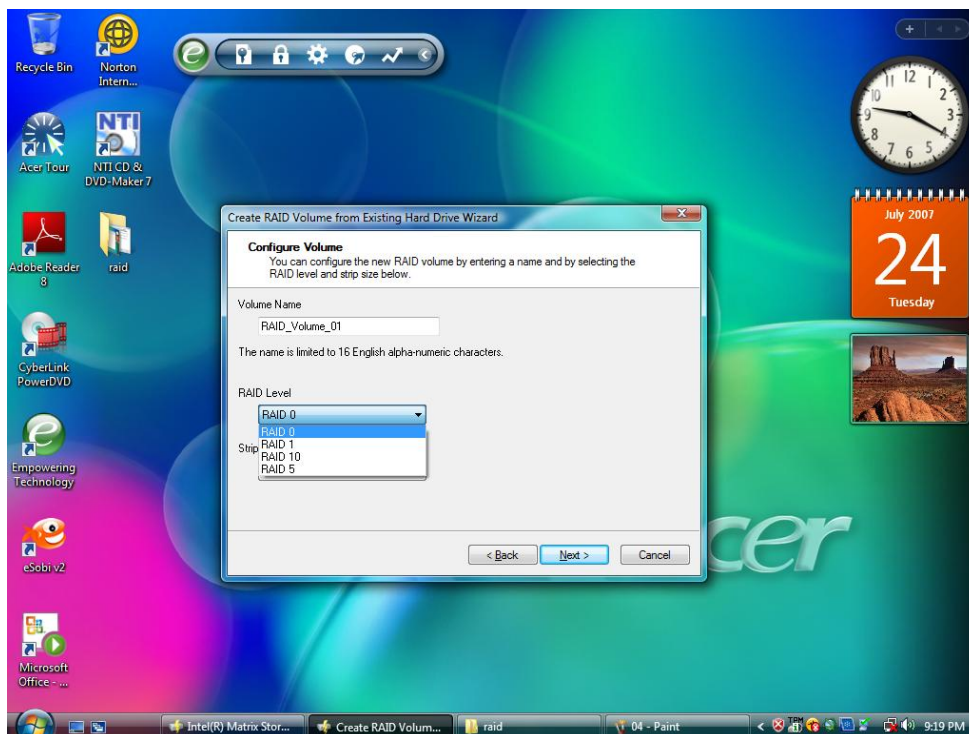
3) Select "Actions" to create a RAID Volume.



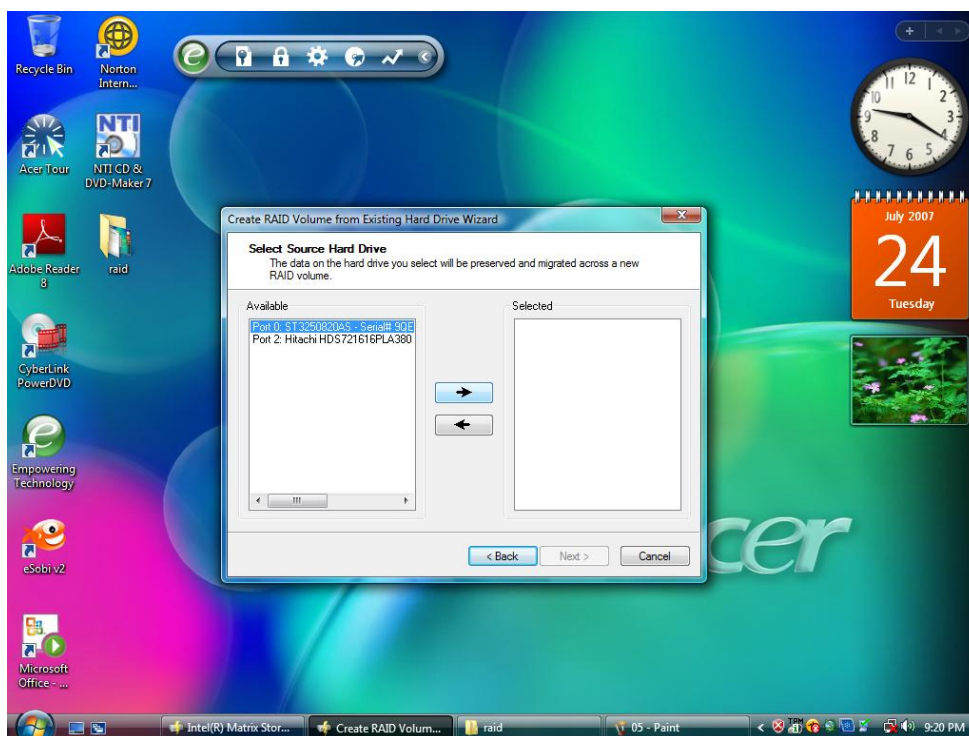
4) Follow the wizard to click "Next"



5) Select the RAID type you want to build up.



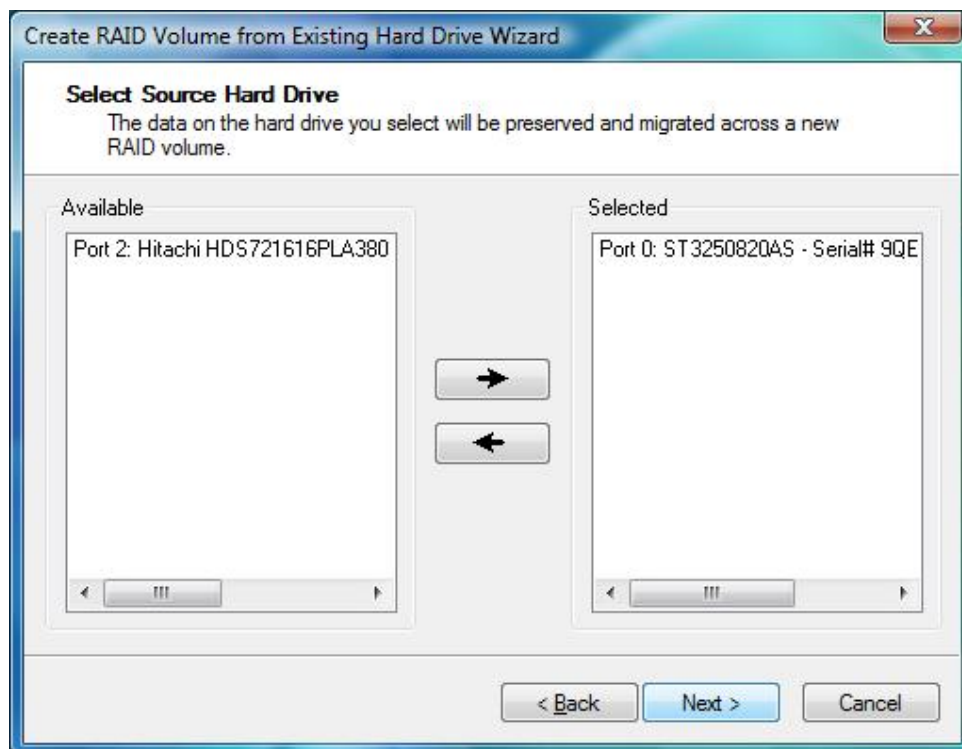
6) Select the SATA HDDs you want to build up RAID volume on.



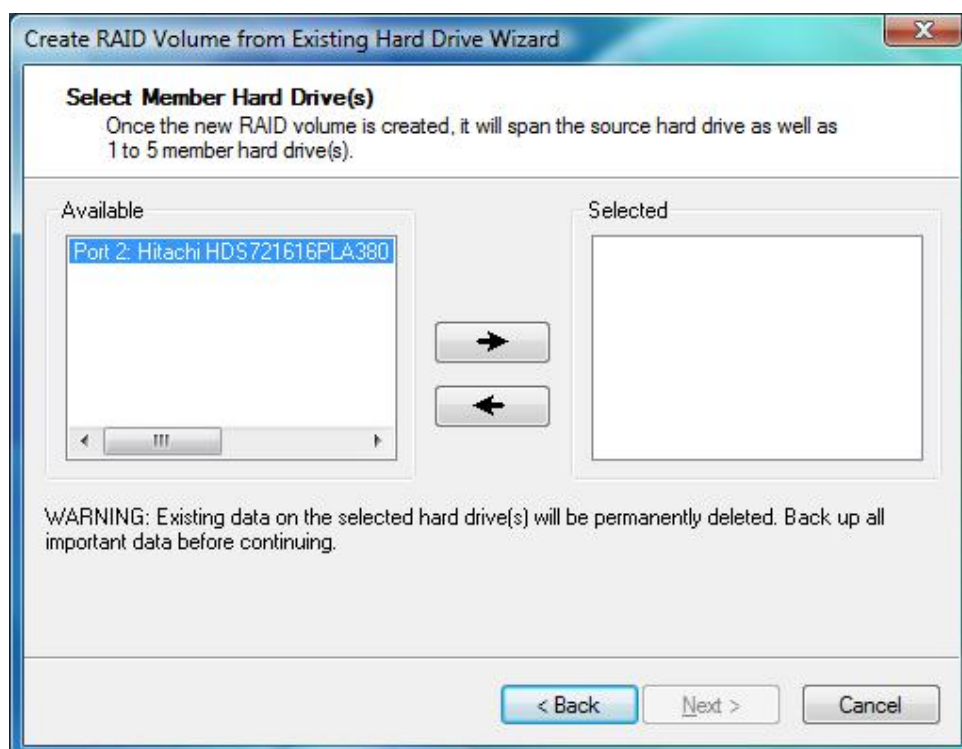
7) To build a RAID0/1 volume requires at least two SATA HDDs.



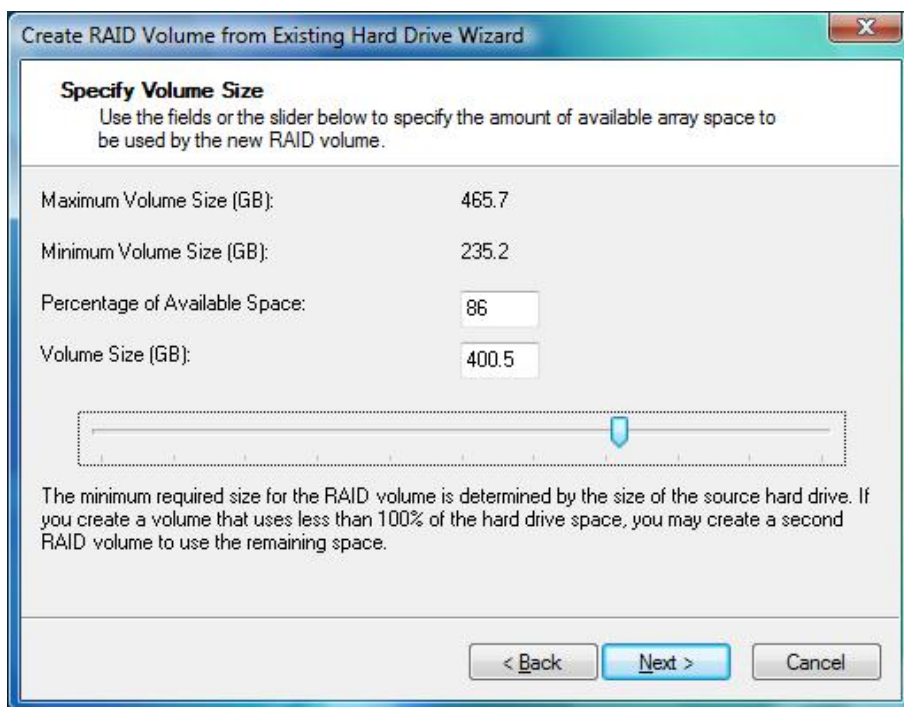
8) Select the source HDD first.



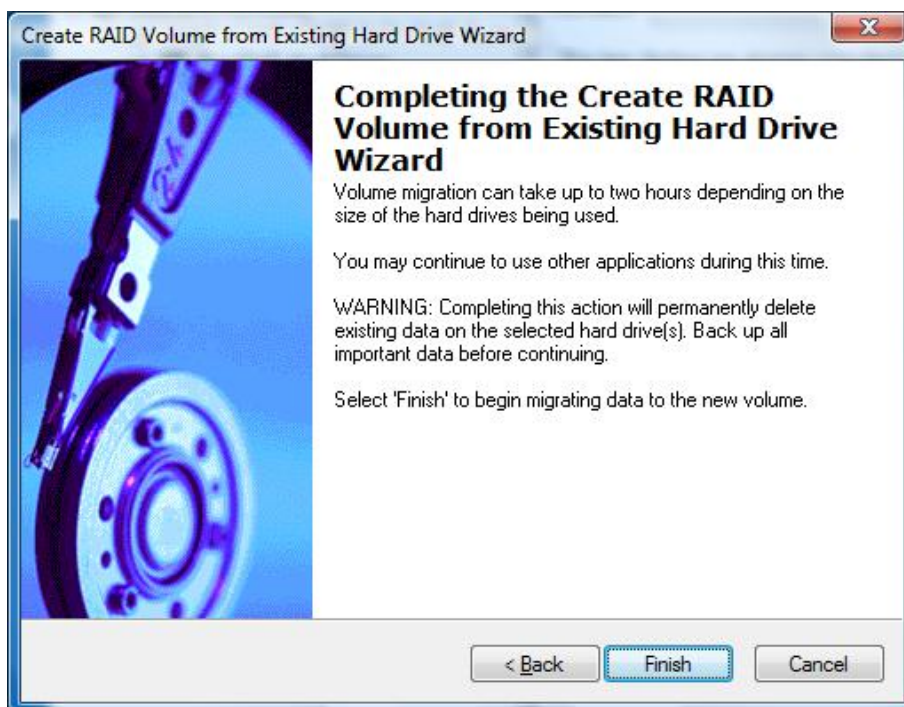
9) Select Member HDD. (Member HDD should be the same size or larger than the Source HDD. )



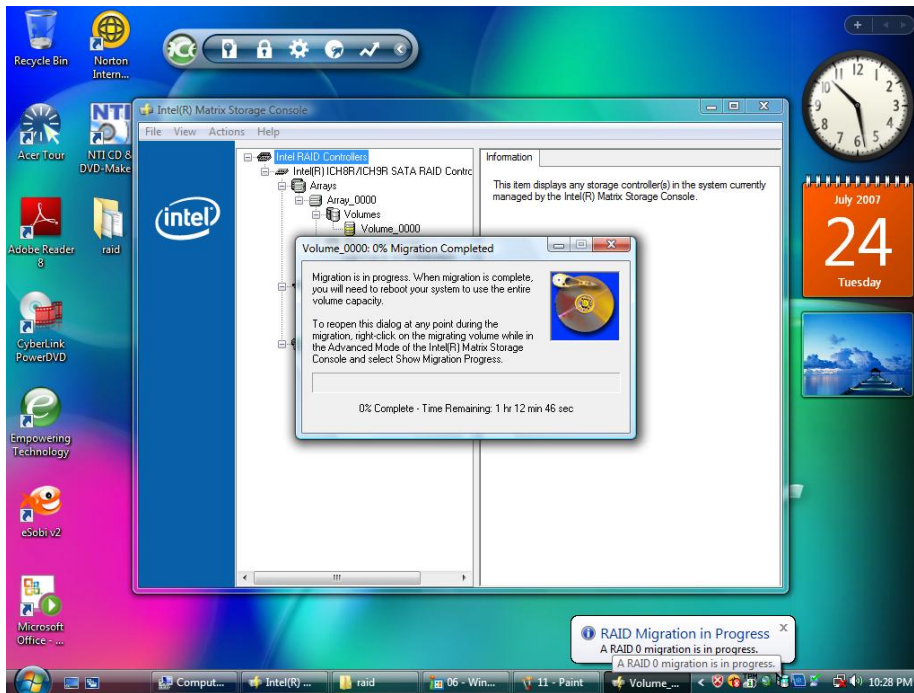
10) Specify RAID Volume size.



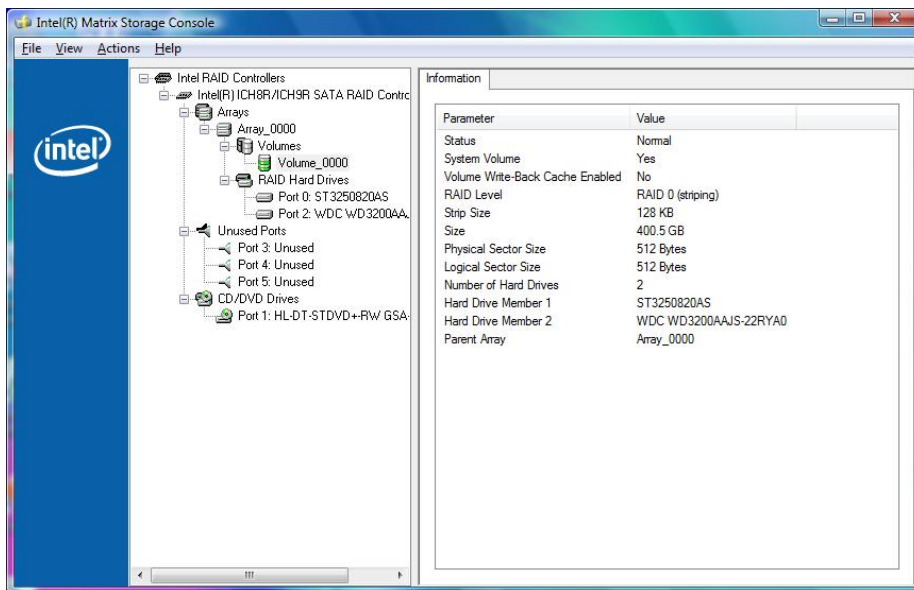
11) Click "Finish" to complete setup.



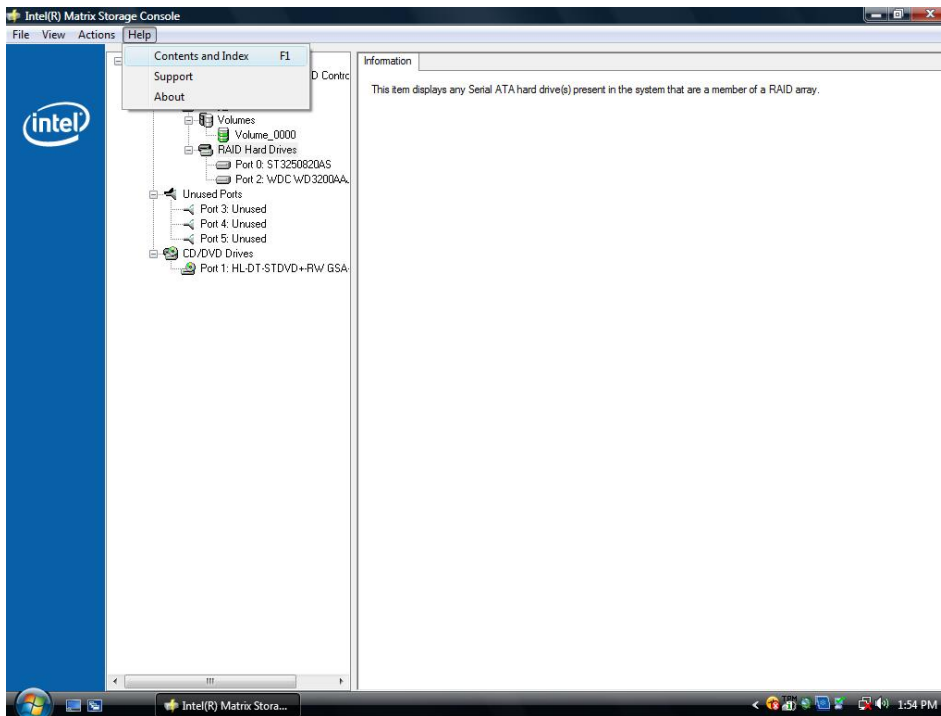
12) System will start to build the RAID volume.



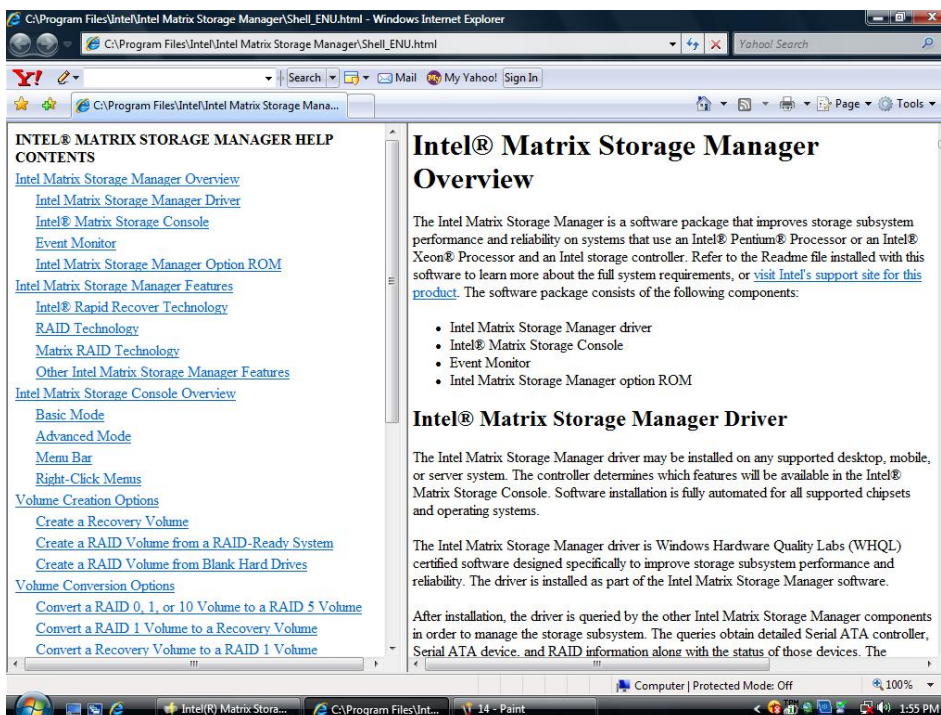
13) You can check the RAID volume status after RAID build completes.



14) For more information, refer to the online user manual: Select Help-> Contents and Index.



15) Click on a link to refer to the information you want.





## 5. Configuring RAID0 or RAID1 on your RAID Ready Acer PC

Selected high-end Acer desktop computer systems are configured as Intel **RAID Ready** systems. You can use the following steps to migrate from a single-drive non-RAID configuration to a two-drive RAID0 or RAID1 configuration. The resulting configuration will be identical to that created by the procedure in section 6.1. To prepare for this, you will need to install another SATA hard drive with a capacity equal to or greater than the capacity of the hard drive being used as the source hard drive.

1. Note the serial number of the hard drive already in the system; you will need this to select it as the source hard drive for the migration.
2. Install the second SATA hard drive to an available SATA port.
3. Boot Windows, then install the Intel Matrix Storage Manager software, if not already installed (it is pre-installed in Acer RAID Ready systems), using the setup package obtained from a CD-ROM or from the Internet. This will install the necessary Intel Matrix Storage Console and start menu links.
4. Open the Intel Matrix Storage Manager from the Start Menu and select Create RAID Volume from Existing Hard Drive from the Actions menu.
5. The Create RAID Volume from Existing Hard Drive Wizard will be activated. Follow the instructions as prompted. It is important to understand what will occur during the migration process because all data on the destination hard drive will be lost.
6. After the migration is complete, reboot the system. If you migrate to a RAID0 volume, use Disk Management from Windows in order to partition and format the empty space created when the two hard drive capacities are combined. You may also use third-party software to extend any existing partitions within the RAID volume.

## **6. Configuring an existing HDD as a RAID0 or RAID1 volume**

If you are booting from a single SATA hard drive that contains program or personal data, you may use the migration feature to use this hard drive as the source hard drive for a migration. After the migration is completed, you will have a two-HDD RAID0 volume where data is striped or a two-HDD RAID1 volume where the data is mirrored across the two SATA hard drives. To do this, the ICH9 I/O Controller must be enabled in the BIOS and you must have the Intel Matrix Storage Manager software installed. (Acer systems enable the RAID controller and have the Matrix storage manager software pre-installed by default.)

Launch Intel Matrix Storage Manager Console and do the following:

1. Note the serial number of the SATA hard drive that is already installed. You will need this to select it as the source hard drive when initiating the migration.
2. Physically attach the second SATA hard drive to an available SATA port.
3. Boot to Windows, install the Intel Matrix Storage Manager software, if not already installed (it is pre-installed in Acer RAID Ready systems), using the setup package obtained from a CD-ROM or from the Internet. This will install the necessary Intel Matrix Storage Console and start menu links.
4. Open the Intel Matrix Storage Console from the Start Menu.
5. Select Create RAID Volume from Existing Hard Drive from the Actions menu. This will activate the Create RAID Volume from the Existing Hard Drive Wizard. Follow the instructions as prompted. It is important to understand what will occur during the migration process because all data on the destination hard drive will be lost.
6. After the migration is complete, reboot the system.

## 7. Migrating from RAID0/1/10 to RAID5 system

RAID level migration allows an existing RAID configuration which supports levels 0, 1 or 10 to be migrated to RAID5. The following migrations are possible:

- 2-drive RAID1 to 3- or 4-drive RAID5
- 2-drive RAID0 to 3- or 4-drive RAID5
- 3-drive RAID0 to 4-drive RAID5
- 4-drive RAID10 to 4-drive RAID5

**Note:** In order for the migration to complete successfully, the minimum SATA hard drive requirements for the new RAID5 configuration have to be met.

Please follow the procedure illustrated below:

1. Boot the system to Windows.
2. Start the Intel Matrix Storage Console application:  
Start Menu -> All Programs -> Intel Matrix Storage Manager -> Intel Matrix Storage Console
3. Click the View menu and select the Advanced Mode option.
4. Choose the RAID volume you want to migrate. Right-click and select Modify Volume.
5. The Modify RAID Volume Wizard will be displayed. The wizard will walk you through the procedure to migrate to RAID5.
6. After the migration starts, the Information tab shows the migration progress in the Status field.
7. When the Status field indicates Normal, the migration is complete.

## 8. Pre-Installation of the Intel® Matrix Storage Manager Driver

This section is for user who may want to install the operating system themselves. Because Acer systems are defaulted as RAID Ready systems, you may need to follow the following steps to pre-install the RAID driver.

The Intel Matrix Storage Manager driver must be installed before installing Windows XP on a RAID volume or when in AHCI mode. The Intel Matrix Storage Manager AHCI driver can be installed over Vista's native AHCI driver.

### 8.1 Build the RAID driver on a floppy disk

You can download the RAID driver from the Acer website or Acer Resource CD. The driver file is named "f6flpy32." Once the build up complete, remove the floppy disk and prepare for Windows installation.

1. On a system running Windows, download the application f6flpy32.exe (for 32-bit operating system) or f6flpy64.exe (for 64-bit operating system) to your local drive.
2. Double click on the application. A dialog box prompting you to **Insert floppy to write** will appear.
3. Insert a blank floppy into floppy drive and click OK to proceed.
4. The application will perform the following tasks:
  - a. Format the disk.
  - b. Write data to the disk
  - c. Verify data on the disk.
5. After the task is done, **About Self-Extractor for WinImage** will be displayed. Click OK to exit.
6. Now your floppy disk will have the valid Intel Matrix Storage Manager Driver which can be used for installation using the F6 process.

### 8.2 Pre-Installation Using the "F6" process

1. When installing Windows XP and older operating systems, the user may encounter a message stating **Setup could not determine the type of one or more mass storage devices installed in your system**. If this is the case, then the user is ready to supply the driver. If this is not the case, press F6 when prompted at the beginning of Windows setup.
2. Press the 'S' key to select **Specify Additional Device**.
3. The user will be prompted to insert a floppy disk containing the manufacturer-supplied driver into the A: drive. (See Section 7.3 for instructions

on making a driver installation disk.)

4. For Windows Vista:

During the operating system installation, after selecting the location to install Vista click the Load Driver button to install a third party SCSI or RAID driver.

5. When prompted, insert the floppy disk or media (Floppy, CD/DVD or USB) created in step 8.1.3 and press Enter.

6. Review the list of available SCSI Adapters. This list should include **Intel® 82801HEM SATA RAID Controller(ICH9M-E)** when the system is in RAID mode and **Intel® 82801HEM SATA AHCI Controller(ICH9M-E)** or **Intel® 82801HBM SATA AHCI Controller(ICH9M)** when the system is in AHCI mode.

7. Select the appropriate Intel RAID controller and press ENTER.

8. The next screen should confirm that the user has selected the Intel® RAID controller. Press ENTER again to continue.

9. After successfully installing the Intel® Matrix Storage Manager driver, Windows setup should continue.

10. Leave the disk in the floppy drive until the system reboots itself. Windows setup will need to copy the files from the floppy again after the RAID volume is formatted and Windows setup starts copying files.